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(54) Title: TREATMENT OF SOIL ON TEXTILES

(57) Abstract: In a process for the dry-cleaning of textiles, a sprayable liquid water-based textile cleaning composition in a spray bottle is used for the pre-treatment of stains. This sprayable liquid textile cleaning composition may comprise one or more phases. The invention also relates to a process for cleaning the soiled textile using this textile cleaning composition in a spray bottle and to kits containing this spray bottle.

TREATMENT OF SOIL ON TEXTILES

FIELD OF THE INVENTION

This invention relates to a compositions and methods for the treatment and pre-treatment of stains using a sprayable liquid textile cleaning liquid applied via a bottle with a spray system. The invention also entails kits that include these liquid cleaning compositions and other elements.

BACKGROUND OF THE INVENTION

Compositions for pre-treating stains before the actual washing process are known from the prior art and as commercially available products. They are mostly marketed in paste form. Liquid detergents or detergent gels which are normally used for washing the hands or for machine washing may also be used for pre-treating stains. Detergents gels in particular can be applied to stains. They are left to act on the stains for a considerable time, after which the textile is washed in a conventional washing process.

Stain pre-treatment compositions which are sprayed onto stains are also known from the prior art and contain either relatively large quantities of anionic and, above all, nonionic surfactants, which produce a detergency-boosting effect in the subsequent washing process, and/or active substances which support the removal of bleachable soils in the subsequent washing process.

Compositions and kits which have a freshening and/or cleaning effect on textiles in a commercially available domestic tumble dryer rather than in a standard washing process have also been available on the market for some time. Corresponding freshening and/or cleaning processes are referred to in the context of the present invention as "dry-cleaning" processes. Dry-cleaning processes are also the subject of numerous patents and patent applications, such as, for example U.S. Patent 5,238,587, U.S. Patent 5,658,651, U.S. Patent 5,746,776, U.S. Patent 5,869,410, U.S. Patent 5,972,041 and U.S. Patent

5,997,586, and International patent applications WO 93/23603, WO 96/39556, WO 99/16995, WO 97/00738, WO 97/00990, WO 96/30471, WO 96/30472, WO 96/30580, WO 96/30582, WO 96/30583, WO 96/37652, WO 97/00939, WO 97/00991, WO 97/00992, WO 97/07278, WO 97/26821, WO 97/29178, WO 97/32004, WO 97/34519, WO 97/412292, WO 97/45416, WO 98/05814, WO 98/17771, WO 98/31863, WO 99/10586. Reference is hereby made to the disclosures of these various patents/applications. In some of them, it is pointed out that the textiles can be pre-treated in a domestically available tumble dryer before the dry-cleaning process is carried out. In these cases, liquid textile cleaning compositions are applied to stained textiles from a bottle using an aid such as, for example, a sponge or a stamp or, alternatively, the stains are dabbed with an impregnated sheet which, for example, may be of textile material or a even a normal paper towel, for example from a kitchen roll.

SUMMARY OF THE INVENTION

One of the problems addressed by the present invention is the removal of stains from textiles. This is achieved using a novel combination of a pre-treatment step and a subsequent treatment step.

Another aspect of the present invention entails a kit containing constituents which would effectively support the removal of stains, especially in dry-cleaning processes.

In a first embodiment, therefore, the present invention relates to the use of a sprayable liquid water-based textile cleaning composition in a bottle with a spray system for pre-treating stains, more particularly in a dry-cleaning process. In addition to large amounts of water, the sprayable liquid water-based textile cleaning composition contains significant quantities of organic solvents. Anionic and nonionic surfactants are also present, including at least three different surfactants and, more particularly, at least four different surfactants.

In another embodiment, the present invention relates to a process for cleaning a soiled textile in which the stained/soiled textile is placed with the

stained area on an absorbent substrate, a liquid textile cleaning composition is applied to the stained area from a bottle with a spray system and the liquid textile cleaning composition is left for a time sufficient to act on the stained area.

In another embodiment, the present invention relates to a textile cleaning kit comprising one or more bags and/or one or more flat porous cleaning sheets impregnated with a cleaning liquid or a cleaning gel. The kit additionally contains a sprayable liquid water-based textile cleaning composition in a bottle with a spray system and optionally one or more absorbent substrates for the stain pre-treatment.

In another embodiment, the invention relates to a sprayable liquid textile cleaning composition which is applied in particular via a bottle with a spray system. The composition is especially suitable for the pre-treatment of stains or soils on textiles, and preferably for pre-treatment of stains or soils on textiles which are subsequently subjected to a dry-cleaning process. This composition may (but not necessarily) comprise several phases and, more particularly, two phases.

DETAILED DESCRIPTION OF THE INVENTION

The present invention, including the above-described embodiments and various versions thereof, is more fully described in the following detailed discussion.

In the context of the present invention, stain pre-treatment or soil pre-treatment (both expressions may be used synonymously) is understood to be the general treatment of soil particles, unwanted constituents, secondary products and other substances undesirably coming into contact with textiles. The typical consumer expects a stain or soil pre-treatment to rid the textile at least substantially from, for example, dust, dirt, perspiration and unwanted odors present in perspiration and nicotine, mustiness and perfume residues which have collected in the textile, and visible relatively small and relatively large stains.

The expression "textiles" encompasses not only clothing and sheeting, but also other articles which, hitherto, would normally have been chemically cleaned, including sheets and covers, curtains, small carpets, upholstery, towels, stuffed animals and the like.

As explained above, the stain pre-treatment of textiles before a subsequent dry-cleaning process in a commercially available domestic tumble dryer is known from the prior art. What is new in relation to the prior art is the use of a sprayable liquid textile cleaning composition applied via a bottle with a spray system.

It has surprisingly been found that the use of a sprayable liquid textile cleaning composition not only provides for faster and easier handling in relation to conventional methods, it also leads to better soil removal.

Any of the hitherto known pre-treatment compositions or textile cleaning compositions used in dry-cleaning processes may be used as the liquid or sprayable textile cleaning composition. Sprayable liquid water-based compositions additionally containing organic solvents are particularly preferred. The water content, based on the composition as a whole, is preferably less than 99% by weight and, in particularly advantageous embodiments, is between 40 and 98% by weight, more particularly between 60 and 95% by weight and advantageously between about 75 and 90% by weight, depending on the content of other constituents.

The quantity of organic solvent is of lesser importance and, for example, may be between 2 and 30% by weight and is preferably between 5 and 25% by weight and, more preferably, up to 20% by weight. Quantities of organic solvent of 5 to 15% by weight have proved to be particularly advantageous. The organic solvent is preferably both ecologically and toxicologically safe, i.e. non-toxic, and miscible with water.

Glycol ethers are preferably used as sole organic solvent or as the principal constituent of a mixture of organic solvents. These materials are lower (alkoxy) or lower (alkoxy) lower (alkoxy) ethers of ethanol or isopropanol. Some glycol ethers are commercially obtainable under the names

of Arcosolv® (Arco Chemical Co.) or Cellosolve®, Carbitol® or Propasol® (Union Carbide Corporation); these glycol ethers also include, for example, ButylCarbitol®, HexylCarbitol®, MethylCarbitol® and Carbitol® itself, (2-(2-ethoxy)-ethoxy)-ethanol. The glycol ether may readily be selected by the expert on the basis of its volatility, its solubility in water, its percentage by weight in the dispersion as a whole and the like. Pyrrolidone solvents, such as N-alkyl pyrrolidones, for example N-methyl-2-pyrrolidone or N-C_{8-12}-alkyl pyrrolidone, or 2-pyrrolidone, may also be used. In addition, glycerol derivatives, more particularly glycerol carbonate, are preferably used as sole solvent or as part of a solvent mixture.

Alcohols which may be used as co-solvents for the purposes of the present invention include liquid polyethylene glycols of low molecular weight, for example polyethylene glycols with a molecular weight of 200. 300, 400 or 600. Other suitable co-solvents are other alcohols, for example (a) lower alcohols, such as ethanol, propanol, isopropanol and n-butanol, (b) ketones, such as acetone and methylethyl ketone, (c) C_{2-4} polyols, such as a diol or a triol, for example ethylene glycol, propylene glycol, glycerol or mixtures thereof. Among the diols, octane-l,2-diol is particularly preferred.

Other organic solvents suitable in principle are conventional chlorinated solvents of the kind typically used in institutional chemical cleaning. These solvents include inter alia the di- to tetrachlorinated derivatives of methane, the di- to pentachlorinated derivatives of ethane, the mono- to trichlorinated derivatives of cyclohexane and monochlorobenzene. Special examples are carbon tetrachloride, methylene chloride, 1,1-dichloroethane, 1,2-dichloroethane, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethane, 1,1,2,2- tetrachloroethane, tetrachloroethane, pentachloroethane, monochlorocyclohexane, 1,4-dichlorocyclohexane, monochlorobenzene, and mixtures of the above. However, these chlorinated hydrocarbons are less preferred for use in the home.

The sprayable liquid textile cleaning compositions may be single-phase homogeneous compositions or multiphase and, more particularly, two-phase

compositions. In the case of multiphase compositions, one phase may have an aqueous base and the other an organic base. The multiphase sprayable liquid textile cleaning compositions are either applied from a multi-compartment bottle with a spray system or, alternatively, are repeatedly shaken before use to form a temporary emulsion.

Organic solvents suitable for forming the two phases of the composition are, for example, hydrocarbons and alkyl ethers. Preferred hydrocarbons are in particular those which have a boiling point above 150°C and preferably above 180°C. Particularly preferred multiphase and, more particularly, two-phase sprayable liquid textile cleaning compositions contain paraffins or isoparaffins with a boiling range of 200 to 300°C. Isoparaffins are particularly suitable for use as sole organic solvent in the multiphase sprayable liquid textile cleaning compositions, although it can be of advantage for the composition as a whole to contain not only hydrocarbons as an organic solvent, but also one of the water-miscible organic solvents mentioned above.

Suitable alkyl ethers are, in particular, dialkyl ethers, above all C_{6-8} alkyl ethers and preferably C_{8-12} alkyl ethers, for example dialkyl ether.

The content of organic solvent in the multiphase and, more particularly, two-phase sprayable liquid textile cleaning compositions is preferably from 5 to 30% by weight and more preferably from 8 to 25% by weight. The compositions advantageously contain 2 to 20% by weight and more particularly 3 to 15% by weight of dialkyl ethers and/or hydrocarbons with high boiling ranges, especially paraffins and isoparaffins with a boiling range above 180°C. If water-miscible and water-immiscible organic solvents are used, the ratio by weight of the water-miscible organic solvents to the water-immiscible organic solvents is preferably 3:1 to 1:3 and more preferably 2:1 to 1:2. Ratios by weight of about 1.5:1 to 1:1.5 are particularly preferred.

Other organic solvents which also have an excellent cleaning effect include butoxypropoxy propanols (BPPs) which are commercially available as a mixture of several isomers. Since BPPs are not completely miscible with water, they are particularly suitable for use in multiphase textile cleaning

compositions. However, if BPPs are to be used in single-phase water-based textile cleaning compositions, emulsifiers would have to be additionally used. For examples of possible emulsifiers, see the disclosure of WO 96/30580.

The compositions according to the invention and the compositions used in accordance with the invention may contain surfactants selected from anionic, nonionic, cationic, zwitterionic, amphoteric surfactants or mixtures thereof. The surfactant content of the compositions may vary over a wide range. The surfactants may even be present in relatively small quantities which can still have a soil-dispersing and hence cleaning-boosting effect. The surfactant content of the compositions is, for example, in the range from 0.2 to 10% by weight, preferably in the range from 0.5 to 10% by weight and more preferably in the range from 1 to 8% by weight of anionic and/or nonionic surfactants. Amphoteric surfactants and/or cationic surfactants are preferably used for the purposes of the invention and may additionally act as fabric softeners. Even relatively small quantities of anionic surfactants not only boost the cleaning effect, but they can also be helpful in achieving more rapid distribution of the composition in the dryer.

Nonionic surfactants include the condensation products of ethylene oxide with hydrophobic polyoxyalkylene formed by the condensation of propylene oxide with propylene glycol. The hydrophobic part of these compounds has a sufficiently high molecular weight to make them insoluble in water. The addition of polyoxyethylene structural units to this hydrophobic part increases the solubility of the molecule as a whole in water and the liquid character of the product is retained to the point where the polyoxyethylene content is about 50% by weight of the total weight of the condensation product. Examples of compounds of this type are certain of the commercially obtainable Pluronic® surfactants (BASF Wyandotte Corp.), more particularly those where the polyoxypropylene ether has a molecular weight of about 1,500 to 3,000 and the polyoxyethylene content is about 35 to 55% by weight of the molecule. A product with such a composition commercially available as Pluronic® L-62.

Preferred nonionic surfactants are alkoxylated, advantageously ethoxylated, more particularly primary alcohols preferably containing 8 to 22 carbon atoms and on average 1 to 12 moles ethylene oxide (EO) per mole alcohol, in which the alcohol residue may be linear or preferably 2-methyl-branched or may contain linear and methyl-branched groups in the form of the mixtures typically present in oxoalcohol residues. However, alcohol ethoxylates with linear residues of alcohols of native origin containing 12 to 18 carbon atoms, for example of coconut, palm, palm kernel, tallow or oleyl alcohol, and on average 2 to 8 EO per mole alcohol are particularly preferred. Preferred ethoxylated alcohols include, for example, C_{12-14} alcohols containing 3EO or 4EO, C_{9-11} alcohols containing 7EO, C_{11-15} or C_{13-15} alcohols containing 3EO, 5EO, 7EO or 8EO, C_{12-18} alcohols containing 3EO, 5EO. or 7EO and mixtures thereof, such as mixtures of C_{12-14} alcohol containing 3EO and C_{12-18} alcohol containing 7EO. The degrees of ethoxylation mentioned are statistical mean values which can be a whole number or a broken number for a particular product. Preferred alcohol ethoxylates have a narrow homolog distribution (narrow range ethoxylates, NREs). In addition to these nonionic surfactants, fatty alcohols containing more than 12EO may also be used. Examples include (tallow) fatty alcohols containing 14EO, 16EO, 20EO, 25EO, 30EO or 40EO. Examples of compounds of condensation products of C_{11-15} fatty alcohol containing 3 to 15 moles ethylene oxide per mole alcohol are C_{11-13} fatty alcohols containing about 7EO, for example Neodol® 23-6,5 of Shell Chemical Co., the PolyTergent® SLF series of Olin Chemicals and the Tergitol® series of Union Carbide, for example Tergitol® 15-S-15 which is formed by condensation of about 15 moles ethylene oxide with a secondary C_{11-15} alcohol, Tergitol® TMN-6, the condensation product of about 6 moles ethylene oxide and isolauryl alcohol, Incropol® CS-12, a mixture of stearyl and cetyl alcohol condensed with about 12 moles ethylene oxide, Incropol® L-7, lauryl alcohol containing 7EO, and Tergitol® 15-S-3, the condensation product of about 3 moles ethylene oxide with a mixture of secondary C_{11-15} alcohols.

acid alkyl esters preferably containing 1 to 4 carbon atoms in the alkyl chain, more particularly the fatty acid methyl esters which are described, for example, in Japanese patent application JP 58/217598 or which are preferably produced by the process described in International patent application WO-A-90/13533. C_{12-18} fatty acid methyl esters containing on average 3 to 15 EO and more particularly 5 to 12 EO are particularly preferred.

Other suitable surfactants are polyhydroxyfatty acid amides corresponding to formula (I):

$$\begin{array}{l} R^3 \\ | \\ R^2\text{-CO-N-[Z]} \end{array} \qquad \text{(I)}$$

in which R^2CO is an aliphatic acyl radical containing 6 to 22 carbon atoms, R^3 is hydrogen, an alkyl or hydroxyalkyl radical containing 1 to 4 carbon atoms and [Z] is a linear or branched polyhydroxyalkyl radical containing 3 to 10 carbon atoms and 3 to 10 hydroxyl groups. The polyhydroxyfatty acid amides are preferably derived from reducing sugars containing 5 or 6 carbon atoms, more particularly from glucose.

The group of polyhydroxyfatty acidamide$_S$ also includes compounds corresponding to formula (II):

$$\begin{array}{l} R^4\text{-O-}R^5 \\ | \\ R^3\text{-CO-N-[Z]} \end{array} \qquad \text{(II)}$$

in which R^3 is a linear or branched alkyl or alkenyl group containing 7 to 12 carbon atoms, R^4 is a linear, branched or cyclic alkyl group or an aryl group containing 2 to 8 carbon atoms and R^5 is a linear, branched or cyclic alkyl group or an aryl group or a hydroxyalkyl group containing 1 to 8 carbon atoms, C_{1-4}

alkyl or phenyl groups being preferred, and [Z] is a linear polyhydroxyalkyl group, of which the alkyl chain is substituted by at least two hydroxyl groups, or alkoxylated, preferably ethoxylated or propoxylated, derivatives of such a group. Again, [Z] is preferably obtained by reductive amination of a sugar, for example glucose, fructose, maltose, lactose, galactose, mannose or xylose. The N-alkoxy or N-aryloxy-substituted compounds may then be converted into the required polyhydroxyfatty acid amides by reaction with fatty acid methyl esters in the presence of an alkoxide as catalyst, for example, in accordance with the teaching of International patent application WO-A-95/07331.

Nonionic surfactants of the amine oxide type (which are also classed as amphoteric surfactants), for example N-cocoalkyl-N,N-dimethylamine oxide and N-tallowalkyl-N,N-dihydroxyethyl amine oxide, and the fatty acid alkanolamide type are also suitable. Amine oxides such as these are obtainable, for example, under the name of Schercamox® (Scher Chem. Co.). A suitable surfactant from this series is, for example, Schercamox® DML (lauryl dimethylamine oxide).Other amphoteric surfactants are known to the expert from the prior art.

Other suitable surfactants are so-called gemini surfactants. Gemini surfactants are generally understood to be compounds which contain two hydrophilic groups and two hydrophobic groups per molecule. These groups are generally separated from one another by a so-called Aspacer®. The spacer is generally a carbon chain which should be long enough for the hydrophilic groups to have a sufficient spacing to be able to act independently of one another. Gemini surfactants are generally distinguished by an unusually low critical micelle concentration and by an ability to reduce the surface tension of water to a considerable extent. In exceptional cases, however, gemini surfactants are not only understood to be dimeric surfactants, but also trimeric surfactants.

Suitable surfactants of the sulfonate type are preferably C_{9-13} alkyl benzenesulfonates, olefin sulfonates, i.e., mixtures of alkene and hydroxy-alkane sulfonates, and the disulfonates obtained, for example, from C_{12-18} monoolefins with an internal or teminal double bond by sulfonation with gaseous sulfur trioxide and subsequent alkaline or acidic hydrolysis of the sulfonation products.

Other suitable surfactants of the sulfonate type are the alkane sulfonates obtained from C_{12-18} alkanes, for example by sulfochlorination or sulfoxidation and subsequent hydrolysis or neutralization. The esters of α-sulfofatty acids (ester sulfonates), for example the α-sulfonated methyl esters of hydrogenated coconut oil, palm kernel oil or tallow fatty acids, are also suitable. Other suitable anionic surfactants are sulfonated fatty acid glycerol esters, i.e. the monoesters, diesters and triesters and mixtures thereof which are obtained where production is carried out by esterification of a monoglycerol with 1 to 3 moles of fatty acid or in the transesterification of triglycerides with 0.3 to 2 moles of glycerol.

Preferred alk(en)yl sulfates are the alkali metal salts and, in particular, the sodium salts of the sulfuric acid semiesters of C_{10-18} fatty alcohols, for example cocofatty alcohol, tallow fatty alcohol, lauryl, myristyl, cetyl or stearyl alcohol, or C_{10-20} oxoalcohols and the corresponding semiesters of secondary alcohols with the same chain length. Other preferred alk(en)yl sulfates are those with the chain length mentioned which contain a synthetic, linear alkyl chain based on a petrochemical and which are similar in their degradation behavior to the corresponding compounds based on oleochemical raw materials. C_{10-16} alkyl sulfates and C_{12-15} alkyl sulfates and also C_{14-15} alkyl sulfates and C_{14-16} alkyl sulfates are particularly preferred from the perspective of washing performance. Other suitable anionic surfactants are 2,3-alkyl sulfates which may be produced, for example, in accordance with US 3,234,258 or US 5,075,041 and which are commercially obtainable as products of the Shell Oil Company under the name of DAN®.

The sulfuric acid monoesters of linear or branched 07-21 alcohol ethoxylated with 1 to 6 moles of ethylene oxide, such as 2-methyl-branched C_{9-11} alcohols containing on average 3.5 moles of ethylene oxide (EO) or C_{10-18} fatty alcohols containing 1 to 4 EO, are also suitable. In view of their high foaming capacity, they are normally used in only relatively small quantities, for example in quantities of 1 to 5% by weight, in detergents.

Other suitable anionic surfactants are the salts of alkyl sulfosuccinic acid which are also known as sulfosuccinates or as sulfosuccinic acid esters and which

represent monoesters and/or diesters of sulfosuccinic acid with alcohols, preferably fatty alcohols and, more particularly, ethoxylated fatty alcohols. Preferred sulfosuccinates contain C_{8-18} fatty alcohol molecules or mixtures thereof. Particularly preferred sulfosuccinates contain a fatty alcohol molecule derived from ethoxylated fatty alcohols which, considered in isolation, represent nonionic surfactants (for a description, see below). Of these sulfosuccinates, those of which the fatty alcohol molecules are derived from narrow-range ethoxylated fatty alcohols are particularly preferred. Alk(en)yl succinic acid preferably containing 8 to 18 carbon atoms in the alk(en)yl chain or salts thereof may also be used.

Other suitable anionic surfactants are fatty acid derivatives of amino acids, for-example of N-methyl taurine (taurides) and/or of N-methyl glycine (sarcosides). The sarcosides or rather sarcosinates, above all sarcosinates of higher and optionally mono- or poly-unsaturated fatty acids. such as oleyl sarcosinate, are particularly preferred.

Other suitable anionic surfactants are, in principle, soaps. Suitable soaps are, in particular, saturated fatty acid soaps, such as the salts of lauric acid, myristic acid, palmitic acid, stearic acid, hydrogenated erucic acid and behenic acid, and soap mixtures derived in particular from natural fatty acids, for example coconut oil, palm kernel oil or tallow fatty acids, but also oleates.

The anionic surfactants may be present in the form of their sodium, potassium or ammonium salts and as soluble salts of organic bases. such as mono-, di- or triethanolamine. The anionic surfactants are preferably present in the form of their sodium or potassium salts and, more preferably, in the form of their sodium salts.

The presence of anionic surfactants even in relatively small quantities of 0.2 to 0.5% by weight has a positive effect. Even relatively large contents, for example above 0.5% by weight to 5% by weight, are entirely desirable; contents of up to as much as 10% by weight are also possible providing the compositions remain sprayable liquid.

Cationic surfactants which may be used are any of those typically present

in fabric softeners. They generally belong to the large classes of quaternary ammonium salts or so-called esterquats. Other suitable cationic surfactants are described, for example, in WO 93/23603. Besides their softening effect, some of these substances also have an antistatic and/or germ-inhibiting effect.

A preferred embodiment of the invention is characterized by the use of a sprayable liquid cleaning composition containing anionic and nonionic surfactants. The sprayable liquid compositions preferably contain at least three different and, more preferably, at least four different surfactants.

Suitable enzymes are, in particular, enzymes from the class of hydrolases, such as proteases, esterases, lipases or lipolytic enzymes, amylases, cellulases or other glycosyl hydrolases and mixtures thereof. All these hydrolases contribute to the removal of stains, such as protein-containing, fat-containing or starch-containing stains, and discoloration in the washing process. Cellulases and other glycosyl hydrolases can contribute towards color retention and towards increasing fabric softness by removing pilling and microfibrils. Oxidoreductases may also be used for bleaching and for inhibiting dye transfer.

Enzymes obtained from bacterial strains or fungi, such as Bacillus subtilis, Bacillus licheniformis, Streptomyces griseus and Humicola insolens are particularly suitable. Proteases of the subtilisin type are preferably used, proteases obtained from Bacillus lentus being particularly preferred. Of particular interest in this regard are enzyme mixtures, for example of protease and amylase or protease and lipase or lipolytic enzymes or protease and cellulase or of cellulase and lipase or lipolytic enzymes or of protease, amylase and lipase or lipolytic enzymes or protease, lipase or lipolytic enzymes and cellulase, but especially protease- and/or lipase-containing mixtures or mixtures with lipolytic enzymes. Examples of such lipolytic enzymes are the known cutinases. Peroxidases or oxidases have also been successfully used in some cases. Suitable amylases include in particular α-amylases, isoamylases, pullanases and pectinases. Preferred cellulases are cellobiohydrolases, endoglucanases and β-glucosidases, which are also known as cellobiases, and mixtures thereof. Since the various cellulase types differ in their CMCase and avicelase activities, the desired activities can be established by

mixing the cellulases in the appropriate ratios.

The enzymes may be adsorbed to supports and/or encapsulated in membrane materials to protect them against premature decomposition. The percentage content of enzymes, enzyme mixtures or enzyme granules may be, for example, about 0.1 to 5% by weight and is preferably from 0.1 to about 2% by weight.

The compositions may additionally contain relatively small quantities of a bleaching agent, more particularly an oxygen bleaching agent, such as hydrogen peroxide. The content of bleaching agent is generally in the range from about 1 to 5% by weight.

The compositions may additionally contain perfumes, deodorants, preservatives, antibacterial agents, insect repellents (mothproofing agents) and/or dyes and also one or more finishes, lubricants, fungicides, etc., providing these additives do not affect the distribution and the removal properties of the composition for relatively small or large stains, pH adjusters such as, for example, organic acids, more particularly citric acid, succinic acid, glutaric acid, adipic acid, gluconic acid and mixtures thereof, may also be present. The quantities in which such additives are present - if at all - are generally from about 0.2 to 5% by weight of the composition as a whole. Organic fragrances, such as cedarwood oil, which also have an insect-repelling effect, are preferably used.

The sprayable liquid compositions are used in a bottle with a spray system for the stain pre-treatment. Bottles with a spray system are known to the expert from the prior art. Particularly suitable spray bottles are those with a pump or trigger spray container which enable a fine and concentrated spray jet to be directed under control onto the textile. Foam-generating pumps are also suitable. One such foam-generating pump is the F2 Finger Pump Foamer marketed by Airspray®. Single-lever or single-arm dispensers which comprise and enclose a liquid container and a foam generator are also known to the expert from the prior art. An improved embodiment of one such foam dispenser is described in hitherto unpublished German patent application 199 51 011.3.

The use of sprayable textile cleaning compositions applied via bottles with

spray systems has clear advantages over the stain pre-treatment systems available on the market or hitherto described in the prior art—particularly when delicate textiles are being treated—because fiber damage is minimized by the contact-free application of the cleaning formulation from the pump or trigger spray bottle. In addition, a system of a sprayable liquid cleaning composition in a pump or trigger spray bottle also provides for faster and easier handling and hence for more effective soil removal. The improvement in soil removal is clearly apparent, especially where a foam dispenser is used.

The bottles may be made of any material known for such purposes; they are normally plastic bottles, polyethylene and polypropylene being preferred. However, other suitable materials are also known in this art. In order to protect the spray nozzle, the bottle may be fitted with a closure cap. Corresponding embodiments are also known from the prior art.

For stain pre-treatment, the stained textile is placed with the stained area on an absorbent substrate and the liquid textile cleaning composition is applied to the soiled area from a spray bottle. The sprayable liquid textile cleaning composition may also be applied to the textile in the form of a blanket foam, depending on the spray system used.

In principle, the textiles used in this process may be of any conventional type. However, it is particularly preferred to use textiles which are otherwise only washed in "delicates" programs of commercially available washing machines or even have to be chemically cleaned. Accordingly, the process according to the invention is particularly suitable for cleaning textiles of wool, cotton, synthetic fibers, including rayon, and silk.

Absorbent substrates are known from the prior art. Absorbent substrates used in a stain pre-treatment process before a subsequent dry-cleaning process are also known from the prior art and may also be used in the process according to the invention. Particularly suitable absorbent substrates are cellulose-containing substrates, for example airlaid cellulose or conventional household kitchen roll (paper towels), as described in WO 93/23603 or other above-mentioned applications, or an absorbent pad of a plastic. Kitchen towels are preferably folded

together before use and placed beneath the stained textile as if were in several layers. Typical plastic pads which may be used are made, for example, from polyurethane foams. A preferred embodiment of the invention is characterized by the use of an absorbent substrate comprising an absorbent layer and a water-impermeable layer.

The absorbent layer advantageously has a fabric weight of 150 to 800 g/cm^3 and, more particularly, in the range from 200 to 600 g/cm^3. Its water absorption capacity is preferably at least 1.5 g/cm^2 and more preferably at least 2 g/cm^2.

The advantages of an absorbent substrate laminated with a water-impermeable layer will immediately become clear to the user in use. The water-impermeable layer preferably consists of polyethylene, polypropylene, polystyrene or plastic-coated board. The list of materials for the water-impermeable layer is by no means complete. The expert knows which other materials may be used in addition to those mentioned.

In another embodiment of the invention, spray bottles which dispense from 0.01 to 2 g, preferably from 0.02 to 1 g and more preferably from 0.05 to 0.5 g of composition per spray are used in the process.

The spraying process may be repeated one or more times, depending upon the type of soil and the stain and the size of the stain.

The liquid textile cleaning composition applied, optionally in the form of a blanket foam, is left to act for an indefinite period. The textile cleaning composition is preferably left to act for between 10 and 300 seconds and more preferably for between 15 and 250 seconds. A contact time of 20 to 180 seconds has proved to be particularly advantageous.

In another preferred embodiment of the invention, a flat porous sheet impregnated with a cleaning formulation is pressed onto the stained area or the stained area is dabbed with the flat porous sheet in addition to the spray treatment and, in particular, after one of the above-mentioned contact times of the liquid cleaning composition.

Suitable flat porous sheets are already known from the prior art and may

consist of a fibrous or cellular flexible material which has sufficient thermal stability for use in a dryer and which may retain sufficient quantities of a cleaning liquid or cleaning gel to effectively clean textiles without significant leakage or "bleeding" of the liquid or gel in storage. Sheets of the type in question include sheets of woven and non-woven synthetic and natural fibers, felt, paper or foam, such as hydrophilic polyurethane foam.

Conventional sheets of non-woven material are preferably used. Non-wovens are generally defined as adhesively bonded fibrous products which have a mat-like or coated fiber structure, or those which comprise fiber mats where the fibers are distributed in a random or statistical arrangement. The fibers may be natural, such as wool, silk, jute, hemp, cotton, linen, sisal or ramie; or synthetic, such as rayon, cellulose ester, polyvinyl derivatives, polyolefins, polyamides or polyesters. In general, any fiber diameter or titer is suitable for the purposes of the invention. By virtue of the random or statistical arrangement of fibers in the non-woven material which impart excellent strength in all directions, the non-wovens used tend not to disintegrate or tear when used, for example, in a normal domestic tumble dryer. Examples of non-wovens suitable as substrates for the purposes of the present invention are known, for example, from WO 93/23603. Preferred porous cleaning sheets consist of one or more fibrous materials, more particularly cotton, finished cotton, polyamide, polyester or blends thereof.

The cleaning liquid or cleaning gel with which the sheet is impregnated may have the same composition as or a different composition from the sprayable textile cleaning liquid stored in a spray bottle. In one preferred embodiment of the invention, the composition of the cleaning liquid or gel is at least substantially identical with the composition of the sprayable textile cleaning liquid. The sprayable water-based cleaning liquid, which may comprise one or more phases and which is used in a spray bottle, and the cleaning liquid or gel on the porous cleaning sheet preferably have 90 to 100% and more preferably 95 to 100% the same composition. With regard to the ingredients used both in the sprayable liquid textile cleaning composition in the spray bottle and also in the cleaning composition with which the porous cleaning sheet is impregnated, reference is

made to the foregoing description. The thickened gel-like cleaning compositions additionally comprise a quantity of organic gelling agent of which the effect is to thicken or gel the liquid dispersions when they are cooled and applied to the sheets. Any organic gelling agent or mixture of organic gelling agents may be used providing it stabilizes the composition for the dry-cleaning process and allows it to adhere to the sheets during production, storage and use and providing there are sheets which distribute the solvent and the surfactants without leaving any significant residue behind on the textile. Suitable gelling agents include modified starches, modified celluloses, such as CMC or HPMS, fatty acid salts and polysaccharide gums, i.e. polysaccharide gums which may be gelled in situ by addition of an effective quantity of one or more metal or ammonium cations.

Preferred gums for use in the present invention are vegetable gums such as the alkali metal salts of alginic acid (alginates), carrageen, pectin, guar gum and mixtures thereof. These "strong" gums revert to the gel state from the solution or from the dispersion and thus provide a continuous gel structure.

Other organic gelling agents, which may be used in the practical application of the present invention, are polyvinyl pyrrolidone, polyvinyl. alcohol, polyacrylamides and polymeric organic waxes. Suitable polymeric waxes include ethylene/acrylate copolymers, ethylene/acrylic acid copolymers and polyethylene (for example oxidized polyethylenes). Materials such as these are commercially available in the form of aqueous emulsions or dispersions. Wax-like polyethylene glycols, above all those with a molecular weight of about 800 to 2,000, are preferred.

0.1 to 5% by weight and, more particularly, 0.2 to 4% by weight, based on the composition as a whole, of the gelling agent(s) is preferably used in the liquid or thickened gel-like cleaning compositions.

In certain circumstances, for example where carrageens are used as the gelling agent, a white residue can be deposited onto the textile to be cleaned when the coated sheet is applied thereto. For this reason, a relatively small but effective quantity of a metal salt, such as a metal halide, is preferably incorporated in the gelled liquid cleaning composition, particularly when colored textiles are to be

treated. Alkali metal or alkaline earth metal salts are preferred for this purpose, potassium, sodium, lithium or calcium chloride in particular being used. The salt is effective in very small quantities, for example even in quantities of 0.0025 to 0.1% by weight, based on the composition as a whole. So far as the production of thickened gel-like cleaning compositions suitable for impregnating flat porous sheets are concerned, reference is made, for example, to the disclosure of WO 93/23603.

The finished sheets are preferably packed in a moisture-impermeable case, for example in (metal) foil or in a case of a composite material of the metal/plastic film or (metal) foil/treated paper type.

In another preferred embodiment of the present invention, the damp and cleaned part of the textile is placed on a new and dry, preferably folded, household kitchen towel or another dry absorbent pad (in addition to the treatment described in the foregoing) for the substantially complete removal of the dissolved soil and the cleaning formulation. Another dry household kitchen towel or another dry absorbent pad is then placed on the damp cleaned part of the textile, pressure being applied to the upper kitchen towel or to the absorbent pad.

In another preferred embodiment of the invention, the textile thus pre-treated is optionally placed in a plastic bag with other pre-treated or non-pre-treated textiles and a flat porous cleaning sheet stably impregnated with a cleaning liquid or cleaning gel. Corresponding plastic bags are also described in the prior art and may be permeable or substantially impermeable to water vapor. The bag is then tumbled with the textile and the impregnated cleaning sheet in a standard domestic tumble dryer, the cleaning liquid or gel on the cleaning sheet coming into contact with the soiled textiles and dispersing the soil. The tumbling process in a standard domestic tumble dryer preferably takes place at temperatures of 40 to 95°C, advantageously over a period of 15 to 45 minutes. After the tumbling process, the cleaned textiles are removed from the bag.

The plastic bags may consist of polyethylene, polypropylene, polyamides, for example Nylon, polyester or a multilayer complex of such materials.

Polypropylene and polypropylene/polyamide bags are particularly

preferred. The bags are welded at their sides or at their lower end. depending on the production process. In another variant, one side is open and provided with a Velcro closure held in place by an adhesive or by welding.

The bag may be vented or include other suitable openings as described, for example, in US patent US 5,658,651 or in International patent applications WO 97/27354 or WO 98/31863.

However, a bag substantially impermeable to water vapor is preferably used, representing a closed system so that the evaporated cleaning liquid can effectively be contained in the bag. In one particularly preferred embodiment, a closed system is formed from the bag by providing the opening of the bag with a reversible closure system. The bags preferably have a closure system of press studs, clips, a slide fastener, a Velcro fastener, a zip fastener or opposite strips with a reclosable adhesive.

The bag can be discarded after use. However, the bag is preferably made of a dryer-resistant and heat-resistant material so that it may be repeatedly used in several cleaning processes.

In another embodiment, the present invention relates to a textile cleaning kit comprising one or more bags which may be substantially impermeable or permeable to water vapor and one or more flat porous cleaning sheets impregnated with a cleaning liquid or a cleaning gel.

The kit additionally contains (a) a sprayable liquid water-based textile cleaning composition of the type described above in a bottle with a spray system and (b) optionally one or more absorbent substrates of the type described above.

Examples

Examples 1 to 11 for sprayable liquid water-based textile cleaning compositions in a bottle with a pump or trigger spray container are set out in Table 1.

Table 1: Sprayable cleaning composition in a spray bottle (figures = % by weight); Examples 1 to 6

Ingredients	1	2	3	4	5	6
Diethylene glycol monoethyl ether	8.00	8.00	10.00	8.00	10.00	8.00
C_{10-16} alkyl sulfate	0.10	0.20	0.35	0.80	0.25	0.40
C_{10-16} alkyl ether sulfate	0.05	0.20			0.35	
C_{10-16} fatty alcohol ethoxylate	0.05	0.30	0.15	0.30		0.20
N-C_{8-12}-alkyl pyrrolidone				0.25		0.20
C_{10-16} alkyl dimethylamine oxide	0.15	2.80	2.20	2.00	2.00	1.50
C_{8-16} alkyl polyglucoside (x = 1.1 to 1.4)					0.40	0.25
Other constituents:						
preservative	+	+	+	+	+	+
defoamer					+	+
perfume	+	+	+	+	+	+
pH adjusters					+	+
Water	to 100	to 100	to 100	to 100	to 100	to 100

Table 1 continued, Examples 7 to 11

Ingredients	7	8	9	10	11
Diethylene glycol monoethyl ether	8.00		5.00	5.00	
Glycerol carbonate	2.00	8.00			
Di-C_{8-12}-alkyl ether			5.00		
Isoparaffin (boiling range between 200 and 260°C)				5.00	10.00
C_{10-16} alkyl sulfate	0 25	0.35	0.40	0.80	
C_{10-16} alkyl ether sulfate	0 35	0.25		0.20	1.00

C_{10-16} fatty alcohol ethoxylate	0.20	0.30	0.30	0.30	0.40
C_{10-16} alkyl dimethylamine oxide	1.80	2.00	2.00	2.50	2.70
Other constituents:					
preservative	+	+	+	+	+
defoamer	+			+	
perfume	+	+	+	+	+
pH adjusters			+	+	+
Water	to 100	to 100	to 100	to 100	to 100

Examples 9 to 11 disclose two-phase textile cleaning compositions which were shaken before spraying

The pH value of the compositions of Examples 1 to 11 was between 7.40 and 8.0 at 20°C.

Twelve liquid or thickened gel-like cleaning compositions with which flat porous cleaning sheets can be impregnated are set out in Table 2 (Examples 12 to 23).

Table 2: Liquid or thickened gel-like cleaning compositions on a porous sheet (figures = % by weight); Examples 12 to 17

Ingredients	12	13	14	15	16	17
Diethylene glycol monoethyl ether	8.00	8.00	8.00	8.00	10.00	10.00
Carrageenane (Hercules)	1.00		0.50		1.00	
Carrageenane (FMC)		0.90				
Potassium chloride		0.06				
C_{10-16} alkyl sulfate	0.20	0.40	0.20	0.40	0.80	0.80
C_{10-16} alkyl ether sulfate	0.05	0.20	0.05	0.20		
C_{10-16} fatty alcohol ethoxylate	0 15	0.30	0.15	0.30	0.25	
C_{10-16} alkyl dimethylamine oxide	0.50	2.00	0.50	2.00	1.20	2.00

C_{8-16} alkyl polyglucoside (x = 1.1 to 1.4)						0.20
Other constituents						
preservative	+	+	+	+	+	+
defoamer	+	+	+	+	+	+
perfume	+	+	+	+	+	+
pH adjusters	+	+	+	+	+	+
Water	to 100	to100	to 100	to 100	to 100	to 100

Table 2 continued. Examples 18 to 23

Ingredients	18	19	20	21	22	23
Diethylene glycol monoethyl ether	10.00	8.00	8.00	2.00	2.00	
Glycerol carbonate		2.00	2.00	8.00	8.00	10.00
Carrageenane (Hercules)		1.00		1.00		0.50
Carrageenane (FMC)	0.90					
Potassium chloride	0.06					
C_{10-16} alkyl sulfate	0.60	0.40	0.40	0.35	0.35	0.40
C_{10-16} alkyl ether sulfate	0.10	0.20	0.20	0.25	0.25	0.10
C_{10-16} fatty alcohol ethoxylate	0.10	0.30	0.30	0.30	0.30	0.20
N-C_{8-12}-alkyl pyrrolidone	0.20					
C_{10-16} alkyl dimethylamine oxide	2.00	2.00	2.00	2.00	2.00	2.00
C_{8-16} alkyl polyglucoside (x = 1.1 to 1.4)						0.25
Other constituents						
preservative	+	+	+	+	+	+
defoamer	+	+	+	+	+	+
perfume	+	+	+	+	+	+
pH adjusters	+	+		+		
Water	to 100	to100	to 100	to 100	to 100	to 100

Cleaning formulations 12 to 23 had a pH value of 7.20 to 7.90 at 20°C.

The formulations of Examples 12 to 14, 16, 18 to 19, 21 and 23 were cloudy and gel-like. Formulations 15,17,20 and 22 were clear liquids.

Any of textile cleaning compositions 1 to 11 may be combined with any of cleaning compositions 12 to 23.

The invention has been described with reference to various specific and preferred embodiments and techniques. However, it should be understood that many variations and modifications may be made while remaining within the spirit and scope of the invention. All references cited herein are incorporated by reference in their entirety.

CLAIMS

1. The use of a sprayable liquid water-based textile cleaning composition for stain pre-treatment before a subsequent dry-cleaning process, characterized in that the textile cleaning composition is applied with a bottle having a spray system.

2. The use according to claim 1, characterized in that the liquid sprayable textile cleaning composition contains less than 99% by weight of water, ~~preferably 40 to 98% by weight of water, and 1 to 30% by weight of organic~~ solvents, more particularly glycol ether, glycerol derivatives and/or butoxypropoxypropanols.

3. The use according to claim 1 or 2, characterized in that the sprayable liquid water-based textile cleaning composition contains at least three, and preferably four, different anionic and nonionic surfactants.

4. The use according to any of claims 1 to 3, characterized in that the textile cleaning composition is a multiphase, more particularly two-phase, composition.

5. The use according to claim 4, wherein the textile cleaning composition is a multiphase composition containing 5 to 30% by weight and more particularly 8 to 25% by weight of organic solvents, 2 to 20% by weight and more particularly 3 to 15% by weight of dialkyl ethers and/or hydrocarbons with high boiling ranges, above all paraffins and isoparaffins with a boiling range above 180°C and/or butoxypropoxypropanols.

6. A process for cleaning a soiled textile, characterized in that

(a) the stained/soiled textile is placed with the stained area on a absorbent substrate,

(b) a liquid textile cleaning composition is applied to the stained area from a bottle with a spray system and

(c) the liquid textile cleaning composition is left for a time sufficient to act on the stained area.

7. The process according to claim 6, wherein a kitchen towel or an absorbent plastic pad is used as the absorbent substrate.

8. The process according to claim 6 or 7, characterized in that the absorbent substrate comprises an absorbent layer and a water-impermeable layer.

9. The process according to claim 8, characterized in that the absorbent layer has a fabric weight of 150 to 800 g/cm^3 and preferably in the range from 200 to 600 g/cm^3.

10. The process according to claim 8 or 9, characterized in that the water-impermeable layer comprises polyethylene, polypropylene, polystyrene or plastic-coated board.

11. The process according to any of claims 6 to 10, characterized in that the bottle comprises a pump spray container or a trigger spray container.

12. The process according to any of claims 6 to 11, characterized in that the quantity of textile cleaning composition dispensed per spray is from 0.01 to 2 g, preferably from 0.02 to 1 g and more preferably from 0.05 to 0.5 g.

13. The process according to any of claims 6 to 12, characterized in that the liquid textile cleaning composition is left to act on the stained area for between 10 and 300 seconds, preferably for between 15 and 250 seconds and more preferably for between 20 and 180 seconds.

14. The process according to any of claims 6 to 13, characterized in that in addition to the spray treatment, the stained area is further treated by pressed upon by or dabbed with a flat porous sheet impregnated with a cleaning formulation.

15. The process according to any of claims 6 to 14, characterized in that for the substantially complete removal of the dissolved soil and the cleaning formulation, the damp and cleaned part of the textile is placed on a dry folded household kitchen towel or dry absorbent pad, and another dry household kitchen towel or dry absorbent pad is then placed on top of the damp cleaned part of the textile, pressure being applied to the top kitchen towel or to the absorbent pad.

16. The process according to any of claims 6 to 15, characterized in that

a) the pre-treated and cleaned textile is placed in a plastic bag impermeable or substantially impermeable to water vapor together with a flat porous cleaning sheet stably impregnated with a cleaning liquid or cleaning gel and optionally together with other pre-treated or non-pre-treated textiles,
b) the bag is then tumbled with the textiles and the impregnated cleaning sheet in a standard domestic tumble dryer, the cleaning liquid or gel on the cleaning sheet coming into contact with the soiled textiles and dispersing the soil, and
c) the cleaned textiles are removed from the bag.

17. The process according to claim 16, characterized in that the bag is impermeable to water vapor and forms a closed system.

18. The process according to claim 15 or 16, characterized in that the bag is dryer-resistant and heat-resistant.

19. The process according to claim 17 or 18, characterized in that a closed system is formed from the bag by the opening of the bag being provided with a reversible closure system.

20. The process according to claim 19, characterized in that the bag has a closure system of press studs, clips, a slide fastener, a Velcro fastener, a zip fastener or oppositely arranged strips with a reclosable adhesive.

21. The process according to any of claims 6 to 20, characterized in that the tumbling process in a domestic tumble dryer is carried out at temperatures of 40 to 95°C.

22. The process according to any of claims 6 to 21, characterized in that the tumbling process lasts 15 to 45 minutes.

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23. A textile cleaning kit comprising one or more bags and one or more flat porous cleaning sheets impregnated with a cleaning liquid or a cleaning gel, which kit additionally contains

a) a sprayable liquid water-based textile cleaning composition in a bottle with a spray system and

b) optionally one or more absorbent substrates.

24. The kit according to claim 23, characterized in that the sprayable liquid water-based textile cleaning composition contains water, organic solvents, and at least three, and preferably four, different anionic and nonionic surfactants.

25. The kit according to claim 23 or 24, characterized in that the sprayable liquid water-based textile cleaning composition and the cleaning liquid or cleaning gel on the flat porous cleaning sheet preferably comprise 90 to 100% and more preferably 95 to 100% of the same composition.

26. The kit according to any of claims 23 to 25, characterized in that the kit contains one or more flexible, flat porous cleaning sheets of non-woven or a woven fabric consisting of one or more fibrous materials, more particularly cotton, finished cotton, polyamide, polyester or blends thereof.

27. The kit according to any of claims 23 to 26, characterized in that the kit contains one or more heat-resistant and dryer-resistant bags made of, or at least predominantly made of, polypropylene, polyethylene, polyamide, polyester or blends thereof.

28. The kit according to claim 27, characterized in that the kit contains one or more bags impermeable to water vapor.

29. The kit according to claim 27, characterized in that the kit contains one or more bags permeable to water vapor.

30. The kit according to any of claims 27 to 29, characterized in that the bag comprises a closure system of press studs, clips, a slide fastener, a Velcro fastener, a zip fastener or oppositely arranged strips with a reclosable adhesive.

31. A kit according to any of claims 23 to 30, characterized in that the kit contains one or more absorbent substrates comprising an absorbent layer and a water-impermeable layer.

32. The kit according to claim 31, characterized in that the absorbent layer has a fabric weight of 150 to 800 g/cm^3 and preferably in the range from 200 to 600 g/cm^3.

33. The kit according to claim 31 or 32, characterized in that the absorbent layer consists of polyethylene, polypropylene, polystyrene or a plastic-coated board.

34. A sprayable liquid water-based textile cleaning composition containing anionic and nonionic surfactants, which comprises several phases, more particularly two phases.

35. The sprayable liquid textile cleaning composition according to claim 34, characterized in that it contains 5 to 30% by weight and more particularly 8 to 25% by weight of organic solvents, 2 to 20% by weight and more particularly 3 to 15% by weight of dialkyl ethers and/or hydrocarbons with high boiling ranges, above all paraffins and isoparaffins with a boiling range above 180°C and/or butoxypropoxypropanols.

36. The sprayable liquid textile cleaning composition according to claim 34 or 35, characterized in that it contains at least three different surfactants and preferably at least four different surfactants.

37. The textile cleaning composition according to any of claims 34 to 36, characterized in that the ratio by weight of the water-miscible organic solvents to the water-immiscible organic solvents is preferably 3:1 to 1:3, and more preferably 2:1 to 1:2, and most preferably 1.5:1 to 1:1.5.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/02654

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : D06L 1/00
US CL : 8/142

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 8/137, 142; 510/293, 295, 297, 285, 291

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
CAPLUS

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Derwent, CAPLUS: "textile", "glycol ether", "surfactant", "dry cleaning"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,746,776 A (SMITH et al.) 05 May 1998 (05.05.1998), cols. 3-9, lines 1-67.	1-2, 6-8, 10-23, 25-31, 33

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
	15 JUN 2001

Name and mailing address of the ISA/US	Authorized officer
Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Yogendra Gupta Jean Proctor Paralegal Specialist
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Form PCT/ISA/210 (second sheet) (July 1998)

Other preferred nonionic surfactants are C_{8-24} fatty acid amides, for example the monoamides of a mixture of arachic and behenic acid and the mono- or dialkanolamides of C_{8-22} fatty acids, for example the diethanolamide, monoethanolamide or monoisopropanolamide of coconut, lauric, myristic or stearic acid or mixtures thereof. Examples thereof include the monoethanolamide of stearic acid.

Other nonionic surfactants which may be used are the ethylene oxide esters of C_{6-12} alkyl phenols, such as (nonylphenoxy)polyoxyethylene ethers. The esters obtained by condensation of about 8 to 12 moles ethylene oxide with nonyl phenol are particularly suitable.

Other suitable nonionic surfactants are the ethylene oxide esters of alkyl mercaptans, such as dodecylmercaptan polyoxyethylene thioesters, the ethylene oxide esters of fatty acids, such as the lauric acid ester of polyethylene glycol and the lauric acid ester of methoxy polyethylene glycol, the ethylene oxide esters of fatty acid amides, the condensation products of ethylene oxide with partial fatty acid esters, such as sorbitol, such as the lauric acid ester of sorbitol polyethylene glycol ether, and other similar materials, the ratio of ethylene oxide to the acid, the phenol, the amide or the alcohol being about 5:1 to 50:1.

In addition, alkyl glycosides corresponding to the general formula $RO(G)_x$, where R is a primary linear or methyl-branched, more particularly 2-methyl-branched, aliphatic radical containing 8 to 22 and preferably 12 to 18 carbon atoms and G stands for a glycose unit containing 5 or 6 carbon atoms, preferably for glucose, may be used as further nonionic surfactants. The degree of oligomerization x, which indicates the distribution of monoglycosides and oligoglycosides, is a number of 1 to 10 and preferably a number of 1.2 to 1.4.

Another class of preferred nonionic surfactants which are used either as sole nonionic surfactant or in combination with other nonionic surfactants, particularly together with alkoxylated fatty alcohols and/or alkyl glycosides, are alkoxylated, preferably ethoxylated or ethoxylated and propoxylated, fatty